von Karman Vortex Streets Generated by Different Shaped Rods

ILDOO KIM, University of Pittsburgh, RORY CERBUS, Purdue University, XIAO-LUN WU, University of Pittsburgh — von Karman vortex street is a pattern of vortices behind a bluff body in a uniform stream. Strouhal number St, a non-dimensional frequency of vortex shedding, depends on Reynolds number Re, however the precise relationship is not known although there were several proposals. To test these proposals and to investigate the nature of vortex shedding, we have generated Karman vortex streets in two-dimensional soap film using conic bodies with different croess-sectional geometric shapes and orientations. We found that the structure-based St-Re relationship, St=1/(A+B/Re), is in good agreement with our experimental data using different shapes and orientations. Two coefficients A and B are functions of geometries and orientations of bluff bodies. Also, we found under certain conditions, two adjacent vortices merge into a big vortex downstream.

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